

<b>Office Action Summary</b>	<b>Application No.</b> 10/710,250	<b>Applicant(s)</b> JIANG ET AL.	
	<b>Examiner</b> DUSTIN Q. DAM	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 14 March 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                                  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____   |

## **DETAILED ACTION**

### ***Summary***

1. This Office Action is in response to the AMENDMENTS TO THE CLAIMS/REMARKS filed on March 14, 2008.
2. Claims 1-19 are currently pending and have been fully considered. The objection to duplicate claim 20 is withdrawn in view of applicant's cancellation of claim 20 in the AMENDMENTS TO THE CLAIMS filed on March 14, 2008. The objection to the Oath/Declaration is withdrawn, after further consideration, in view of the telephone conversation with Mr. Douglas Fekete on March 6, 2008. The rejections of claims 1-19 under 35 U.S.C. 103(a) appearing in the Office Action sent on December 13, 2007 are maintained and presented below.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over HAMAMOTO et al. (U.S. PG-Pub 2002/0185169 A1).

a. With regards to claim 1, HAMAMOTO et al. discloses a stacked thermocouple structure (FIG. 1) comprising a plurality of first conductors (6, FIG. 1 & 2) on a surface (1a, FIG. 2) and forming a first material (1<sup>st</sup> sentence, [0041]), each of the first conductors having first and second ends and a thickness in a direction normal to the surface (FIG. 1 & 2), a dielectric layer (7, FIG. 2) on each of the first conductors, a plurality of second conductors (8, FIG. 1 & 2) on the dielectric layer and formed of a second material (2<sup>nd</sup> sentence, [0041]) that differs from the first material, Each second conductors having a thickness in a direction normal to the surface (FIG. 1 & 2), a first end overlying and contacting the first end of the corresponding first conductor (FIG. 1), and a second end overlying but separated from the second end of the corresponding first conductor by the dielectric layer (FIG. 1 & 2), and a plurality of third conductors (8, FIG. 1 & 2). As depicted in FIG. 2, the portion of the conductor 8, that fills contact holes 7a, is construed to be the second conductors while the portion of conductor 8 that is above and to the side of contact holes 7a, is construed to be the third conductors. HAMAMOTO et al. discloses the third conductors (8, FIG. 1 & 2) electrically interconnecting the second end of one of the second conductors with the second end of one of the first conductors other than the first conductor on which the second conductor lies (FIG. 1).

b. With regards to independent claim 1, HAMAMOTO et al. does not appear to explicitly teach the second conductor having a thickness that is smaller than the thickness of the third conductor as claimed in claims 1 and 12 or a thickness that is three times smaller than that of the third conductor as claimed in claims 4 and 14. However, FIG. 2 appears to depict the second conductor (8 at the portion filling the contact holes 7a, FIG.

2) to be three times thinner than that of the third conductor (8 at the portion above and to the side of contact holes 7a, FIG. 2). Alternatively, it would have been obvious to a person with ordinary skill to have the portion of the second conductors, which fill the contact holes, to be thinner than the third conductors since the contact holes are formed from a solid dielectric layer (7, FIG. 2) in which a thinner layer would yield less material to etch, or remove by other processes, to create the contact holes (7a, FIG. 2).

c. With regards to claim 2, HAMAMOTO et al. discloses second conductors (8, FIG. 1 & 2), in the portion that fills contact holes 7a, and third conductors (8, FIG. 1 & 2) which are formed with the same material as the second conductors (2<sup>nd</sup> sentence, [0041]).

d. With regards to claim 3, HAMAMOTO et al. does not appear to explicitly disclose the dielectric layer having a thickness less than the thickness of the second conductor. However, it would have been obvious to a person having ordinary skill in the art to form a dielectric layer that has a thickness less than that of the thickness of the second conductor since the only difference between the claimed invention, as claimed in claims 3 and 13, and the thermopile sensor, as disclosed by HAMAMOTO et al., is the claimed relative proportions of the dielectric layer and the second conductor, which the dielectric layer in the claimed invention would not perform differently than that of the thermopile sensor disclosed by HAMAMOTO et al. which is to insulate the first and second conductors from one another except at the contact hole portions (MPEP 2144.04 A) since it is generally obvious to change the relative dimensions. Alternatively, it would have been obvious to a person with ordinary skill to form a dielectric layer that has a thickness less than that of the thickness of the second conductor since the contact holes

are formed from a solid dielectric layer (7, FIG. 2) in which a thinner layer would yield less material to etch, or remove by other processes, to create the contact holes (7a, FIG. 2).

e. With regards to independent claim 4, HAMAMOTO et al. does not appear to explicitly teach the second conductor having a thickness that is smaller than the thickness of the third conductor as claimed in claims 1 and 12 or a thickness that is three times smaller than that of the third conductor as claimed in claims 4 and 14. However, FIG. 2 appears to depict the second conductor (8 at the portion filling the contact holes 7a, FIG. 2) to be three times thinner than that of the third conductor (8 at the portion above and to the side of contact holes 7a, FIG. 2). Alternatively, it would have been obvious to a person with ordinary skill to have the portion of the second conductors, which fill the contact holes, to be thinner than the third conductors since the contact holes are formed from a solid dielectric layer (7, FIG. 2) in which a thinner layer would yield less material to etch, or remove by other processes, to create the contact holes (7a, FIG. 2).

f. With regards to claim 5, HAMAMOTO et al. discloses the third conductors (8, FIG. 1) and the second ends of the first and second conductors defining a cold junction (12, FIG. 1 and 3<sup>rd</sup> sentence, [0045]).

g. With regards to claim 6, HAMAMOTO et al. discloses the first material being polysilicon (1<sup>st</sup> sentence, [0041]) and the second material being aluminum (2<sup>nd</sup> sentence, [0041]).

h. With regards to claim 7, HAMAMOTO et al. discloses the first and second conductors which define steps and are traversed by the third conductors (FIG. 2).

- i. With regards to claim 8, HAMAMOTO et al. discloses the surface defined by a second dielectric layer (5, FIG. 2) on a substrate (1, FIG. 2) and each of the first conductors (6, FIG. 2) is on the second dielectric layer.
- j. With regards to claim 9, HAMAMOTO et al. discloses the second conductors (8, FIG. 2 {the portion filling contact holes 7a}) having lateral widths less than lateral widths of the first conductors (6, FIG. 2) so as to define steps from the substrate to the second conductors, the steps being traversed by the third conductors.
- k. With regards to claim 10, HAMAMOTO et al. discloses a thermopile sensor which include power terminals (13 & 14, FIG. 1) and inherently produces an output dependent on a temperature difference between the first (11, FIG. 1) and second (12, FIG. 1) ends of the first and second conductors.
- l. With regards to claim 11, HAMAMOTO et al. discloses a thermopile that is a component of a thermal sensor package (1<sup>st</sup> sentence, [0002]).
- m. With regards to claim 12, HAMAMOTO et al. discloses a stacked thermocouple structure of a thermopile (FIG. 1) that inherently produces an output dependent on a temperature difference between hot (11, FIG. 1) and cold (12, FIG. 1) junctions of the thermopile, the stacked thermocouple structure comprising a plurality of first conductors (6, FIG. 1 & 2) on a surface (1a, FIG. 2) and forming a first material (1<sup>st</sup> sentence, [0041]), each of the first conductors having first and second ends and a thickness in a direction normal to the surface (FIG. 1 & 2), a dielectric layer (7, FIG. 2) on each of the first conductors, a plurality of second conductors (8, FIG. 1 & 2) on the dielectric layer and formed of a second material (2<sup>nd</sup> sentence, [0041]) that differs from the first material,

Each second conductors having a thickness in a direction normal to the surface (FIG. 1 & 2), a first end overlying and contacting the first end of the corresponding first conductor (FIG. 1) to define one of the hot junctions (11, FIG. 1), and a second end overlying but separated from the second end of the corresponding first conductor by the dielectric layer (FIG. 1 & 2), and a plurality of third conductors (8, FIG. 1 & 2) formed of a second material (2<sup>nd</sup> sentence, [0041]). As depicted in FIG. 2, the portion of the conductor 8, that fills contact holes 7a, is construed to be the second conductors while the portion of conductor 8 that is above and to the side of contact holes 7a, is construed to be the third conductors. HAMAMOTO et al. discloses the third conductors (8, FIG. 1 & 2) electrically interconnecting the second end of one of the second conductors with the second end of one of the first conductors other than the first conductor on which the second conductor lies (FIG. 1) and defines one of the cold junctions (12, FIG. 1).

n. With regards to independent claims 12 and 14, HAMAMOTO et al. does not appear to explicitly teach the second conductor having a thickness that is smaller than the thickness of the third conductor as claimed in claim 12 or a thickness that is three times smaller than that of the third conductor as claimed in claim 14. However, FIG. 2 appears to depict the second conductor (8 at the portion filling the contact holes 7a, FIG. 2) to be three times thinner than that of the third conductor (8 at the portion above and to the side of contact holes 7a, FIG. 2). Alternatively, it would have been obvious to a person with ordinary skill to have the portion of the second conductors, which fill the contact holes, to be thinner than the third conductors since the contact holes are formed from a solid

dielectric layer (7, FIG. 2) in which a thinner layer would yield less material to etch, or remove by other processes, to create the contact holes (7a, FIG. 2).

o. With regards to claim 13, HAMAMOTO et al. does not appear to explicitly disclose the dielectric layer having a thickness less than the thickness of the second conductor. However, it would have been obvious to a person having ordinary skill in the art to form a dielectric layer that has a thickness less than that of the thickness of the second conductor since the only difference between the claimed invention, as claimed in claims 3 and 13, and the thermopile sensor, as disclosed by HAMAMOTO et al., is the claimed relative proportions of the dielectric layer and the second conductor, which the dielectric layer in the claimed invention would not perform differently than that of the thermopile sensor disclosed by HAMAMOTO et al. which is to insulate the first and second conductors from one another except at the contact hole portions (MPEP 2144.04 A) since it is generally obvious to change the relative dimensions. Alternatively, it would have been obvious to a person with ordinary skill to form a dielectric layer that has a thickness less than that of the thickness of the second conductor since the contact holes are formed from a solid dielectric layer (7, FIG. 2) in which a thinner layer would yield less material to etch, or remove by other processes, to create the contact holes (7a, FIG. 2).

p. With regards to claim 15, HAMAMOTO et al. discloses the first material being polysilicon (1<sup>st</sup> sentence, [0041]) and the second material being aluminum (2<sup>nd</sup> sentence, [0041]).

- q. With regards to claim 16, HAMAMOTO et al. discloses a thermopile that is a component of a thermal sensor package (1<sup>st</sup> sentence, [0002]).
- r. With regards to claim 17, HAMAMOTO et al. discloses the first and second conductors which define steps and are traversed by the third conductors (FIG. 2).
- s. With regards to claim 18, HAMAMOTO et al. discloses the surface defined by a second dielectric layer (5, FIG. 2) on a substrate (1, FIG. 2) and each of the first conductors (6, FIG. 2) is on the second dielectric layer.
- t. With regards to claim 19, HAMAMOTO et al. discloses the second conductors (8, FIG. 2 {the portion filling contact holes 7a}) having lateral widths less than lateral widths of the first conductors (6, FIG. 2) so as to define steps from the substrate to the second conductors, the steps being traversed by the third conductors.

### *Response to Arguments*

- 6. Applicant's remarks filed March 3, 2008 have been fully considered but they are not persuasive.
  - a. Applicant's remarks in the 3<sup>rd</sup>-4<sup>th</sup> paragraphs starting on page 7 and ending on page 8 in the response filed March 3, 2008 have been fully considered but are not persuasive. Applicant asserts that HAMAMOTO et al. acknowledges the problem that the applicant is trying to solve in (HAMAMOTO et al.: [0013], [0017], and [0091]) but by a different means than the current application. Applicant asserts that the structure size can be reduced because the length of the first and second conductor segments can be decreased without the thermal isolation, thereby bringing the thermocouple sites at each

end of the segments closer together without reducing sensitivity, and thus without these features, HAMAMOTO et al. do's not anticipate or suggest Applicant's invention.

However, these arguments are not persuasive since they are not directed to the invention, as claimed.

b. Applicant's remarks in the 1<sup>st</sup> paragraph on page 8 in the response filed on March 3, 2008 have been fully considered but are not persuasive. Applicant argues two points, the first being that HAMAMOTO et al. does not show overlaying first and second conductors and the second being HAMAMOTO et al. does not show using a third conductor having a thickness greater than the thickness of the second conductor. With regards to the first argument, HAMAMOTO et al. discloses a plurality of first conductors (6, FIG. 1 & 2), a plurality of second and third conductors (8, FIG. 1 & 2 the portion of the conductor 8, that fills contact holes 7a, is construed to be the second conductors while the portion of conductor 8 that is above and to the side of contact holes 7a, is construed to be the third conductors.) The claimed term "overlying" is interpreted to mean "to lie over or upon", in which "over" indicates "upper or higher". Thus, the claimed term "overlying" does not limited the conductors to be directly above, and the term is reasonably interpreted to mean "to lie over" or "to lie higher than". This interpretation of the claimed term "overlying" is consistent with the rejection of claims 1-19 under 35 U.S.C. 103(a) in the Office Action sent December 13, 2007. HAMAMOTO et al. discloses the second end of the second conductors separated from the second end of the corresponding first conductor by the dielectric layer and "overlying" or lying higher with respect to the first conductor (as depicted in FIG. 1 and FIG. 2, the cross sectional view

of FIG. 1). With regards to the second argument, HAMAMOTO et al. discloses a third conductor (8, FIG. 1 & 2 the portion of the conductor 8, that fills contact holes 7a, is construed to be the second conductors while the portion of conductor 8 that is above and to the side of contact holes 7a, is construed to be the third conductors) which appears to be thicker (as depicted in FIG. 2 which appears to be drawn to scale, indicated by the distances). The examiner also asserts that given HAMAMOTO et al., it would have been obvious to a person having ordinary skill in the art to have the portion of the second conductors, which fill the contact holes, to be thinner than the third conductors since the contact holes are formed from a solid dielectric layer (7, FIG. 2) in which a thinner layer would yield less material to etch, or remove by other processes, to create the contact holes (7a, FIG. 2).

c. The remaining arguments are directed toward the dependencies on claim 1 in which these remarks have been addressed above.

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DUSTIN Q. DAM whose telephone number is (571)270-5120. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

dd  
June 9, 2008

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